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DURIP: Optical Fiber Gratings Using UV Light and IR Light

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6. AUTHORS
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13. ABSTRACT (*Maximum 200 words*)
DURIP Equipment only grant. Equipment purchased: Precision translation stage, Pulsed UV laser, and CO2 laser. Technical accomplishments are described in the final technical report of F49620-98-1-0051.

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Final Report
F49620-00-1-0263

Submitted to:
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1) Date submitted: OCTOBER 4, 2001

2) Title: DURIP 00-01 OPTICAL FIBER GRATINGS USING UV LIGHT AND IR LIGHT

3) Principal Investigator: JACK FEINBERG, DEPARTMENT OF PHYSICS
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4) Time period covered: APRIL 15, 2000 – APRIL 14, 2001

5) Institution Name: UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CALIFORNIA 90089-0484

6) Federal agency identifying award number: F49620-00-1-0263

7) Special circumstances regarding equipment acquisition: None

FINAL REPORT

F49620-00-1-0263

DURIP 00-01: OPTICAL FIBER GRATINGS USING UV LIGHT AND IR LIGHT

This is an "equipment only" grant under the Defense University Research Instrumentation Program. A report of the results obtained with this equipment is contained in the final report for Grant F49620-98-1-0051, "OPTICAL FIBER GRATINGS USING NEAR-UV LIGHT. To avoid duplication of paperwork, only a partial summary of that report will be duplicated here.

This grant is to purchase equipment to further investigate the physical properties of optical gratings written in optical fibers using ultraviolet and infrared light. The major equipment purchased in this grant includes:

Equipment Description (Vendor)	**Expense**
Precision translation stage (Newport)	$41,414
CO2 laser (Synrad)	$7,142
Tunable IR laser (Santec)	$41,414

A precision translation stage from the vendor Aerotech was not delivered before the end of this grant, so that order for $32,475 was cancelled.

Key accomplishments using the above equipment are:

1) We performed experiments to reveal how light alters the refractive index of germanium-doped optical fibers. We found that loading the fiber with hydrogen turns on a separate physical mechanism so that all of the Ge atoms become photosensitive, instead of only the Ge defects.

2) We perfected methods of writing long-period gratings in fibers with no unwanted harmonics or sidelobes.

3) We fabricated a large number of fiber gratings in germanium-doped fibers and supplied these gratings to other research groups for demonstration of systems applications. These include using fiber gratings as adjustable dispersion compensators and as adjustable delay elements in a fiberoptic network.

4) We performed and presented new results on the strength of gratings written through the polymer coating of optical fibers.

5) We invented a new type of fiber sensor that needs no spectrometer and that works in real time. It senses either temperature or strain.

A more detailed report of the results achieved using this equipment can be found in the final report of Grant F49620-98-1-0051.